POLAR BEARS INTERNATIONAL

Annual Newsmagazine

POLAR BEARS INTERNATIONAL

2022–2023

POLAR BEARS and **PEOPLE: INTERTWINED FUTURES**

Several years ago, climate scientist Katharine Hayhoe joined us in Churchill during the polar bear migration to take part in our Tundra Connections broadcasts. She was thrilled by the chance to see polar bears in the wild, and quick to help our viewers recognize that climate warming is not just a problem for polar bears, but for people, too.

Most important, she emphasized that solutions are there.

Katharine's inherent optimism and can-do spirit aligns with our own approach at Polar Bears International. Her new book, "Saving Us," provides the hope and the pep talk we need to bring about change. One of the key ways we can build momentum, she says, is to ***talk about climate change*** with others—because if we're not talking about it, why should we care? And if we don't care, why should we do anything about it?

Thanks to Katharine, I've learned to have casual conversations about climate change with others around me, looking for natural openings like a local extreme weather event, the sharp increase in home insurance prices, or, thanks to my work, polar bears—followed by a quick pivot to talking about solutions, like the wind farms being built across the prairies and the huge drop in prices for renewable energy.

As engaged citizens, we have the power to change our world. In addition to keeping climate "top of mind" by talking about it, we can also help create a sustainable future by voting with the climate in mind in every election, no matter how small. (For our U.S. readers: the midterms matter.) But it doesn't end there. A recent study shows the importance of regularly contacting our representatives, sharing our concerns, and speaking up for climate-friendly policies. In other words, ***talking about it!***

Polar bears are remarkable animals, living in an incredibly beautiful, yet fragile, environment. We hope you enjoy this issue of our newsmagazine and leave with a commitment to stay engaged and remain involved—for polar bears and for all of us.

Sincerely,

Krista Wright

Krista Wright
Executive Director

Polar Bears International's mission is to conserve polar bears and the sea ice they depend on. We also work to inspire people to care about the Arctic and its connection to our global climate.

INSIDE THIS EDITION

Editor: Barbara Nielsen
Art Director: Emily Ringer
Designer: Amy Kelley Hoitsma

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WORLD RANGER DAY AWARD 2022

Every year on World Ranger Day, July 31, we present our World Ranger Day Award to an individual or team working to reduce conflict between polar bears and people. This year, we were pleased to honor the dedicated men and women of the Watchman Crew in Ny-Ålesund, a remote community in Spitsbergen, Svalbard, known for its Arctic research station.

Set at a latitude of 79 degrees north, the settlement has about 40 year-round residents. During the summer fieldwork season, the numbers swell to roughly 150 people as researchers from all over the world travel to the station to take samples and do measurements.

"Thanks to the bravery and commitment of the Watchman Crew, both polar bears and people live safely with each other," said Krista Wright, executive director of Polar Bears International. "Their work is an excellent example of how to coexist with polar bears in a changing Arctic."

The Watchman Crew is staffed by employees of Norway's state-owned company, Kings Bay, which operates the community. The team works on rotation 24/7 to help with incidents like fires, power outages, or curious polar bears. The crew currently consists of eight women and men: Erlend Havenstrøm, Espen Blix, Ida Kristoffersen, Jakob Weiset, Marine Ilg, Morten Østlund, Sigmund Lønnve, and Tormod Eknes.

When polar bears come close to the community, crew members do their best to avoid dangerous situations. They use flare guns or shotguns with slugs to scare the bears away without harming them, as well as cars or snowmobiles. In cases where the bears persist, the Governor of Svalbard can help by scaring them off with a helicopter or possibly relocating them.

"Polar bears are only chased away if they enter the settlement or the immediate proximity," said Lars Ole Saugnes, Kings Bay director. "Polar bears in the field are to be expected in Svalbard, and everyone living and working here respects that people are just visitors in the kingdom of the polar bear.

"We have a very competent crew and there have never been any episodes where people have been injured by polar bears, and no bears have been shot in the community since 1998. We have a high awareness of the polar bear danger in Svalbard, regardless of weather, eternal daylight in summer, or the long polar night in winter—and we thoroughly appreciate the award!"

Past recipients include Vladelin Kavry of Russia's Umky Patrollers; Churchill, Canada's Polar Bear Alert Team; Wildlife Officer Erling Madsen of Ittoqqortoormiit, Greenland; The North Slope Borough's Polar Bear Patrols in Alaska; the rangers of Russia's Wrangel Island Nature Reserve; and Leo Ikakhik and Joe Savikataaq Jr. of Arviat, Nunavut.

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POLAR BEAR RESEARCH

"Over the past two decades, a looming question has emerged: How do you study an ice-dependent species when your study area is melting away?"

IN A CHANGING ARCTIC

By Dr. Todd Atwood

In January of 1992, a lone female cub was born in a den located on the lee side of a pressure ridge on the pack ice of the Beaufort Sea. In late March, the mother bear popped her nose through the den's ceiling to let in the first rays of daylight for her cub, and over the next week slowly acclimated the cub to life outside the den. Eventually, the mom felt confident in her cub's ability to tolerate the challenging environment and left the den for good to find her first meal in roughly five months. That April, researchers from the U.S. Geological Survey's Polar Bear Research Program captured the family on the sea ice north of Prudhoe Bay, Alaska—giving the mom and her cub small ear tags with unique identification numbers and adding them to the database.

Twenty years later, I was part of a research team flying in a helicopter over the snow-covered sea ice of the southern Beaufort Sea in search of polar bears to sample for the program's long-term population dynamics study, research that helps us understand how the bears are faring. We had been slowly flying over a network of intertwined leads (narrow slivers of open water between ice floes) when someone shouted, "There's a bear!" It took me a moment to isolate the small flash of pale yellow within the flat light of the vast and snowy-white background. It was my first time seeing a polar bear in the wild and it was majestic. Once we were on the ice with the bear, we noted the ear tag indicating a previous capture. The grizzled 20-year-old, 200-kilogram female was the same individual captured as a 13-kilogram cub in 1992.

I have since seen hundreds of polar bears and the excitement has never waned. My colleagues and I are privileged to study the bears and feel the weight on our shoulders to continue to produce rigorous and timely science that can be used to ensure their long-term persistence. But over the past two decades, a looming question has emerged: How do you study an ice-dependent species when your study area is melting away?

A CHANGING ARCTIC AND THE LOSS OF "BEAR-ABLE" DAYS

The loss of sea ice habitat from human-caused climate warming is the primary threat to polar bears—and to the ability of researchers to study them. In

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1992, sea ice was present in the southern Beaufort Sea throughout the year. In 2012, it was functionally ice-free in August and September. More recently, it has been ice-free, on average, for upwards of three months each year. The ice-free period is expected to continue to increase in duration unless greenhouse gas emissions are meaningfully reduced.

Changes to summer and fall sea ice conditions have been dramatic and have garnered a lot of media attention. But winter and spring conditions have also deteriorated, which has increased the challenges and risks to field crews working on the sea ice. The thinner first-year ice that now dominates the southern Beaufort Sea is more mobile in winter and spring. It has become harder to judge ice stability and thickness—critical factors when deciding whether it's safe to capture a bear.

Moreover, the frequency of wind-storm events in winter and spring has increased. Strong winds can crack and shear the sea ice, further fragmenting habitat and creating expanses of open water. Water vapor from the warmer exposed ocean mixes with the much colder air and condenses into fog. The fog can arrive with little warning, grounding air crews or leading to "boomerang flights" where conditions are suitable for take-off but deteriorate offshore, necessitating a hasty retreat to avoid getting stuck on the ice. Since 2001, our program has experienced

continued on page 16

Coexisting *with* Polar Bears

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By Kim Titchener

A few years back my friend Jason Bantle asked me to help him come up with a title for a photography book he was writing on polar bears. Like all bears, polar bears are a species that often get a bad rap with humans. Too often, the first thing I hear when I mention them is, "Oh, they like to eat people. Very dangerous!"

So, I took the opportunity to provide a new perspective and describe bears in the way I see them. Bears are gracious. Not all the time, but, for the most part, they put up with a lot from us. For such "dangerous animals" they rarely attack or kill humans. I took one look at the cover image of Jason's book—a photo of a confident, strong female polar bear, standing on the ice—and thought "Grace."

Bears often grace us with their presence, and it is their willingness to share space with us, to choose to leave when they hear us coming, to allow people to snap their picture while they try to survive in one of the world's harshest and fastest changing climates, that for me embodies their grace. So, I suggested "State of Grace: A Photographic Tribute to Canada's Polar Bears," and that's the title he used.

"One thing that always stands out to me is that bears usually choose to avoid conflict with us."

Bears are enormously generous with their tolerance of us, but how must we adapt to their presence to ensure their longevity on the landscape?

My area of work has primarily been with black and grizzly bears in Western Canada, Alaska, and the few places left where grizzlies still roam in the lower 48 of the United States. I have spent the past 18 years helping humans learn to live, recreate, and work in habitats where bears live and to find their own solutions to reduce conflict and help sustain bear populations.

One thing that always stands out to me is that bears usually choose to avoid conflict with us. They've had no choice but to learn to adapt to our presence. We are the new neighbors, day walkers on their lands

Photos © Daniel J. Cox/NaturalExposures.com

and seas. When we build our homes, trails, and take natural resources from their habitat, we do so with little thought of the bears. And because of that, for the most part, we humans are the cause of the majority of the conflicts that occur between bears and people.

Sadly, the solution often proposed when bear conflicts occur is to hunt them more, to "get more guns for protection." Flawed beliefs are widespread and often perpetuated by media coverage: "There must be too many of them, we can't possibly be the cause!" "They must be 'rogue' to do such damage." Most of the time when I hear of a bear conflict, I'm able to pinpoint that the cause is linked to our inability to understand what coexistence actually means. It means compromise—on our part. To coexist with any bear, we must change the way we live and work in their habitat. We must choose to manage wildlife attractants and educate ourselves about bear-safe practices. But few do.

I'm now working with Polar Bears International to help determine how Arctic communities can prepare to live with polar bears in increasing closeness as sea ice melts and the landscape shifts. I'm learning from the people of the North: their values and beliefs about how it should be and, in some cases, how it once was. I'm not here to tell them how to live with polar bears, but to ask, "What are you willing to compromise to make it work?" The first peoples have been living with bears for thousands of years. But polar bears and Arctic communities are now experiencing the impacts of climate warming, with bears spending more time on land and closer to communities, where they can gain access to attractants like garbage and landfills.

None of the challenges have an overnight fix, but are there compromises we can make now to live better with these animals? Yes. It's possible, I've seen it. I worked with the community of Canmore, Alberta for 10 years, helping them find ways to reduce conflicts and better coexist with bears. The community of Churchill, Manitoba has also been successful at reducing conflicts by making their landfill bear-resistant, integrating a Polar Bear Alert program, and creating a Churchill Bear Safe Working Group to continue progress.

Access to human food and garbage is a serious and growing threat to polar bears. It draws bears into communities and camps and increases negative interactions that may result in the injury or death of people and relocation or destruction of polar bears. Government agencies need to clean up their landfills and provide residents and business owners with bear-resistant bins. Many communities with polar bears are ill-prepared for the negative impacts of human-food conditioned bears. Reducing the risk to people and bears needs to be a priority, especially for communities that are just starting to see polar bears frequenting their lands. The importance of waste management can't be overstated—it protects people and saves polar bears immediately.

"To coexist with any bear, we must change the way we live and work in their habitat."

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The other solutions needed for polar bear conservation require more complex and cooperative compromises. Recently I had the honor of meeting members of the community of Churchill, their government agencies, and local business owners. I collated their concerns, ideas, and experience to create the first stage of a polar bear hazard assessment for the region. Common themes came from these discussions that may be of value to communities throughout the Arctic who are now, or soon will be, living with polar bears.

A glimpse at solutions includes educating communities and visitors on polar bear safety to increase public awareness and reduce human-bear conflicts. The polar bear guiding industry needs their own set of guidelines. The tourism-marketing agencies that bring people to these destinations need to advertise a more realistic

continued on page 17

DO POLAR BEARS INVENT TOOLS?

By Dr. Ian Stirling

"Countless anecdotal accounts ... suggest [bears] are very clever and creative, especially when the potential for something to eat is involved."

Polar bears and walruses are not only two of the largest marine mammals in the Arctic, but they relate to each other as predator and potential prey in some intriguing ways. At first glance, adult walruses might appear relatively invulnerable to predation, simply because of their sheer size; their thick, heavy skin; their massive, heavy skulls; and, of course, their large, dangerous tusks. Even so, walruses of all ages remain of interest to polar bears simply because there is so much to eat, even on a young animal.

However, walruses are not easy for a polar bear to kill. Even a young calf has a thick, heavy skull that requires multiple bites from a large bear to finally kill it. Compare this to the single bite to the head from a bear of any size that immediately kills or incapacitates a ringed seal. A subadult walrus may take hours to kill, even by an adult male polar bear. All of which makes one ask: Which strategy by a polar bear might make preying on a large walrus likely to be successful?

CREATIVE PROBLEM-SOLVING

Because of their large brain size, polar bears, like their black and grizzly bear relatives, are thought to be highly intelligent. Furthermore, countless anecdotal accounts of the behavior of all three species suggest they are very clever and creative, especially when the potential for something to eat is involved.

For example, consider how creative a polar bear would need to be to solve the following unnatural opportunity for obtaining food without getting caught. Back in 1971, the late bear biologist, Dr. Charles Jonkel, was using foot snare traps to capture polar bears during the first tagging studies done on the western coast of Hudson Bay near Churchill, Manitoba. One morning, he found the snare at one of the trap sites had been set off without catching the bear … but the bait used to attract it was gone. From tracks in the snow, it appeared that one or more bears had used rocks on the ground beside the trap site to set off the trigger to the foot snare and obtain the bait without being captured. Jonkel then removed the rocks and covered the area around the trap with boards. In response, the bear (or bears) apparently then used rocks—some moved from up to two meters away—to spring the trap and access the food again without being caught.

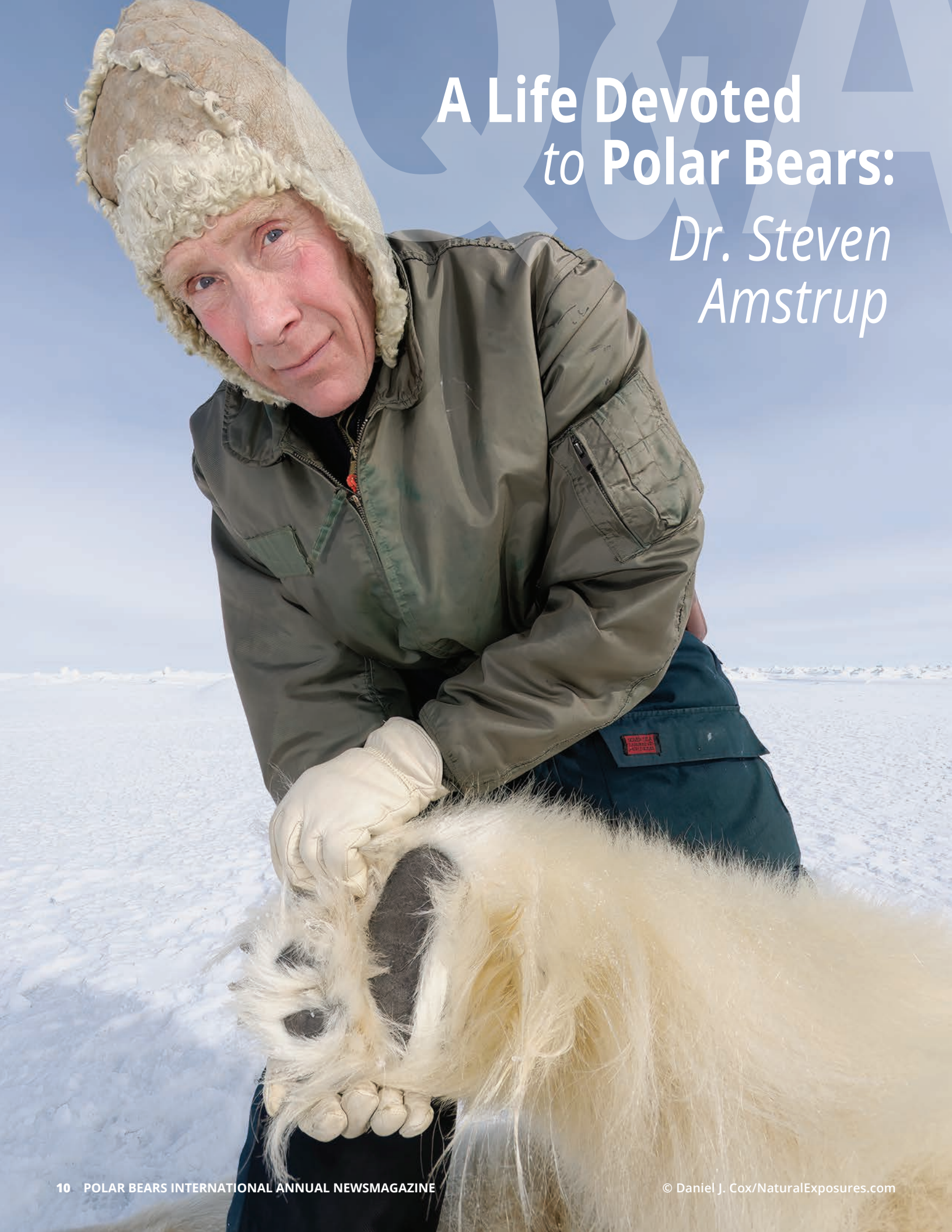
That anecdote is only one of many about a hungry bear (polar, black, or grizzly) analyzing a novel opportunity to obtain food and then creating an imaginative potential solution on the spot. This inventive part of a bear's nature is relevant when we consider reports of possible tool use by polar bears, going as far back as 1780 when the famous Danish biologist, Otto Fabricius, reported, based on accounts from Inuit hunters in Greenland, that polar bears were capable of "grabbing pieces of ice and launching them against the walrus's head … making it lose its balance and thus killing it easily."

However, probably the best-known report of possible polar bear tool use is the illustration of a bear on top of a cliff hurling a stone down at an unsuspecting walrus in Charles Francis Hall's 1865 account of his explorations in Baffin Island. Hall's Inuk guide and companion told him that, "In August, every fine day, the walrus makes his way to the shore, draws his huge body up on the rocks, and basks in the sun. If this happens near the base of a cliff, the ever-watchful bear takes advantage of the circumstance to attack this formidable game in this way: The bear mounts the cliff and throws down upon the animal's head a large rock, calculating the distance and the curve with astonishing accuracy, and thus crushing the thick bullet-proof skull. If the walrus is not instantly killed—simply stunned—the bear rushes down to the walrus, seizes the rock and hammers away at the head until the skull is broken."

During the following decades, several explorers and naturalists were told about polar bears in different parts of the Canadian Arctic attacking a walrus by first throwing a piece of ice or a boulder at it. The similarity of this story in the traditional knowledge of

continued on page 18

Which strategy by a polar bear might make preying on a large walrus likely to be successful?



A Life Devoted *to* Polar Bears: *Dr. Steven Amstrup*

By Barbara Nielsen

In 2010, Polar Bears International's chief scientist, Dr. Steven Amstrup, retired from his 30-year position as Polar Bear Project Leader for the U.S. Geological Survey to join our team. At the end of this year, he is planning to pass the baton to the next generation while remaining involved with our work. I recently talked with Steven about his career, his passionate commitment to polar bear conservation, and his hopes—and plans—for the future.

Q: You've spent your entire career as a biologist, including more than four decades working with polar bears. What sparked your interest?

I've always had a love and a craving for nature and wildlife. During my boyhood in Minnesota, my brother and I spent hours exploring the outdoors. I also pored over books about wildlife and watched nature-focused television shows. Wild Kingdom was my favorite. I was fascinated to learn that there were people whose work was to try to "save" wild animals and the wild places they needed. By age five or six, I knew that's what I wanted to do. As a child I imagined that where there were bears, it was truly wild, and I dreamed of someday working with them.

Q: How did that fascination with wildlife lead you to polar bears?

After high school, I earned an undergraduate degree in forestry at the University of Washington in Seattle and then was accepted into my dream MSc program at the University of Idaho, studying black bears. After graduating, I worked briefly with the Utah Division of Wildlife before moving to Wyoming for a job with the U.S. Fish and Wildlife Service, studying pronghorn antelope and sharp-tailed grouse.

My experience with black bears served me well when the FWS decided to hire someone who could hit the ground running and reactivate a flagging effort to learn about Alaska's polar bears. At the time, little was known about them. The chance to work with such impressive animals, living, not on land, but in the other-worldly setting of drifting pack ice, far exceeded my childhood dreams.

© Max Lowe

Q: What was it like in the early years studying polar bears in Alaska?

When I first went to Alaska in 1980, my work focused on understanding the polar bears' basic biology, and I helped answer many questions about them, from where they den to how far they travel. I also helped document their recovery from severe overhunting in the 1950s and 1960s, which had caused their populations to plunge. Excessive harvest in Alaska and elsewhere led the five polar bear nations to sign a landmark agreement in 1973 to regulate hunting—the first international agreement focused on a single wildlife species.

Until the mid-1990s, the future looked positive for polar bears. Back then, every talk I gave was fun.

continued on page 20

The Importance of Satellite Tracking to Polar Bear Conservation

By Dr. Kristin Laidre

Last spring, while working in the numbing cold on the sea ice off East Greenland, I fastened a satellite collar around the neck of a sedated adult female polar bear—part of a research project to better understand how these bears are faring in a warming Arctic.

Prior to the first successful use of such collars off the coast of Alaska in 1977, scientists had many unanswered questions about polar bears, including such basics like where they roam and where they den.

So much has changed since then.

BREAKTHROUGH TECHNOLOGY

Polar bears range widely across international boundaries, occurring in low numbers across a vast and sparsely populated Arctic. Studying them in remote and large areas is incredibly challenging. Because we can't physically follow polar bears throughout the year, satellite telemetry—which pings data from a satellite-linked radio tag to a satellite orbiting overhead—has made an enormous difference in studying polar bears. The devices allow us to track their movements and gain valuable insights, even in frigid winds, subzero cold, and the darkness of the polar night.

During field work, my fellow scientists and I attach radio tags to a small sample of adult female polar bears, allowing us to track them over multiple years. The data are critical to our understanding of how the bears use remote habitats and survive in harsh—and changing—Arctic conditions.

To deploy radio tags, we sedate the bears. We do this via helicopter-based darting in Greenland, although in some areas bears on land are captured in culvert traps or darted from snowmobiles. Polar bears

typically remain immobilized and sedated for up to one hour, during which time we mark them (with ear tags and tattoos) or re-identify them if captured before. We also measure the bears, weigh them, and collect tissue samples. Several studies have investigated the effects of capture and handling on polar bear behavior and found no long-term negative impacts.

A LONG HISTORY

After the first successful use of satellite telemetry in Alaska 45 years ago, follow-up research took place in the late 1970s and early 1980s in Canada and Greenland. Since those initial studies, advances in technology, tag attachment/release methods, and satellite systems have refined the trackers and improved their ability to remotely monitor polar bears, resulting in widespread and diverse use across the Arctic.

Most satellite-linked radio tags used in polar bear research are attached as collars, and almost exclusively to adult female bears. Young bears are generally not collared to avoid potential injury as they grow, and adult males can't be collared because their necks are wider than their heads, causing the collars to slip off. Next-generation methods including harnesses, ear-mounted transmitters, glue-to-fur transmitters, and implants have been tried without success or are being tested.

RESEARCH VALUE

In 2022, I was the lead author of an international collaborative paper that reviewed the value of satellite telemetry in addressing 21st century conservation and management challenges. These include estimating sustainable harvest rates, understanding the impacts of climate warming, identifying critical habitat, and assessing potential impacts from human activities including tourism, resource development, and extraction.

As an example of the insights gained, early scientific debate in the 1970s focused on whether there was one or more polar bear populations across the Arctic. Scientists were able to settle the question thanks to satellite data from collared adult females. The data showed that there are multiple polar bear populations in the Arctic. It also revealed that bears have seasonal fidelity to localized areas and sometimes encounter natural obstacles that impact their movements. Since then, researchers have used satellite data to document cross-migration among populations and identify occasional long-distance movements across population boundaries—including a power-walking

continued on page 22

"We now have a greater need to monitor where polar bears roam, how they use their habitat, how abundant they are, and whether populations can remain connected with each other."

Can Polar Bears Adapt to Climate Warming?

By Dr. Andrew Derocher

Such a simple question but as with most things one might ask a professor, there's no easy (or short) answer. As a scientist, I've been trained to form hypotheses, collect data, analyze it, and then assess the results objectively based on the evidence in hand.

The earth's climate changes over geological time and thus, over the evolutionary history of polar bears, they've seen colder periods and warmer periods. During colder periods, the bears moved south and even reached areas as far south as Ireland, Sweden, Denmark, and the Alaska Panhandle. The bears often left fossil evidence behind. However, this southward march during the last ice age also provides us insights about warming. The southern range of polar bears contracted as the climate warmed. The bears didn't adapt to warmer conditions, they didn't become more terrestrial, they didn't find enough terrestrial resources. They died out.

To answer the adaptation question, it's critical to the history of the polar bears' habitat over time. The best insights we have suggest that the modern winter ice maximum in the Arctic (usually in late winter) started about 2.6 million years ago. While we still don't know exactly when polar bears evolved as a distinct species from their grizzly bear ancestors,

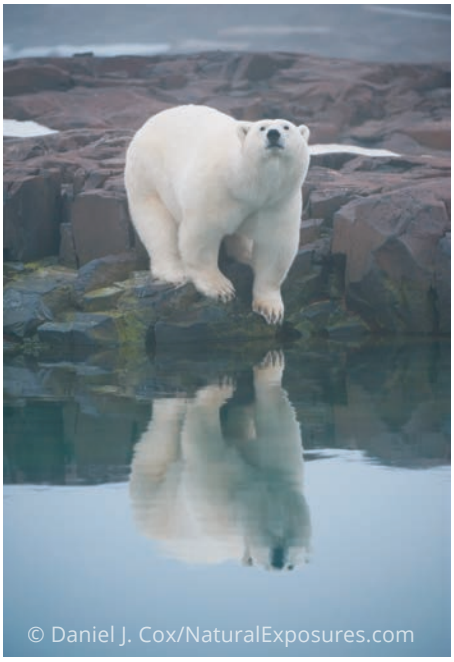
"Modern, human-caused climate change is happening so fast that evolution for a long-lived species like the polar bear isn't possible."

it's clear that sea ice has been around about as long as the bears have. It's been a dynamic time for sea ice and the bears alike.

We know that gene flow between polar bears and grizzlies has occurred in both directions. Grizzlies picked up a few polar bear genes over time and vice versa. The latest research suggests that polar bears have undergone a genetic bottleneck. In essence, the low genetic diversity of polar bears likely resulted from major reductions in past abundance. Why does this matter? Genes and genetic diversity are the foundation of evolution. However, modern, human-caused climate change is happening so fast that evolution for long-lived species like polar bears isn't possible. Evolution takes thousands or millions of years for species with slow life histories.

Adaptation to a warming Arctic would normally mean evolution. But on a shorter scale, we can think about a species using its current genetic make-up to full advantage. This is where some people get hopeful about the future of polar bears in a warming Arctic. It's easy to find studies showing polar bears eating bird eggs, hunting reindeer, or feeding on novel prey. However, spending some time reading the early explorer history books, or talking to Inuit or other northern elders, will reveal that there's precious little new in such behaviors. Polar bears have always exploited any available calories that return a positive energy gain. But we also know that terrestrial foods aren't abundant or widespread enough to sustain polar bear populations.

So, what can we expect as the Arctic warms? We know from dozens of studies how polar bears are affected. The first link is warming in an area that is followed by changes in sea ice significant enough to affect the ecosystem. Of the 19 polar bear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"What can we expect as the Arctic warms? We know from dozens of studies how polar bears are affected."

populations across the Arctic, all have experienced reduced sea ice over the last four decades but not all have lost enough ice to affect polar bears. In those populations where the sea ice has declined enough to affect the bears, the first biological sign we see is a drop in body condition. The bears are simply unable to store as much fat as they used to, leading to lower reproductive success and reduced survival of the youngest and oldest bears.

Our research has shown that many pregnant adult females can store enough fat to successfully give birth to and nurse cubs in winter. In spring, they return to the sea ice to hunt seals, fattening up for the coming summer fast. The weak link, however, may be how long the spring hunting season is for these new mothers. A shortened feeding period reduces their ability to store enough fat to survive the ice-free months. It's important to recall that a polar bear mother will nurse her cubs for over two years but only if she has adequate energy reserves to ensure her own survival. We now suspect that many mothers fail to lactate through the whole ice-free period. Once they stop nursing their cubs, which have limited fat stores of their own, the family is on a countdown to the ice formation that will allow them to resume hunting in the autumn. If the ice is delayed, cubs in their first year of life don't make it to their second. This weak link may explain why the number of yearling families has dropped in some areas in recent years.

So far, only three polar bear populations have shown a significant decline. Recent research shows, however, that all but a few polar bear populations will likely disappear by the end of the century if we remain on our current emissions path. Those remaining will be in the High Arctic. Persistence in these northern areas is the hope we need. Slowing the current warming and reducing greenhouse gases will give future generations of polar bears what they need. If we can eventually let the planet cool, the bears will return south once again as they have in the past.

So, can polar bears adapt to climate change? Not if one means human-caused climate change, which is happening at a pace too fast to allow them to evolve. Perhaps the more relevant question is: "Do we want to act to slow, and eventually stop, climate change so that polar bears can survive?"

Dr. Andrew Derocher is a professor of biological sciences at the University of Alberta and a long-time scientific advisor to Polar Bears International.

RESEARCH *in a* CHANGING ARCTIC

continued from page 5

a substantial decline in "bear-able" days (i.e., days we are able to fly and search for bears) due to poor weather conditions like extensive fog or high winds that create dangerous flight conditions. From 2001-05, we were grounded due to weather an average of 23% of the field season. From 2017-21, we were grounded an average of 56% of the field season.

COPING WITH UNCERTAINTY

If you are familiar with the television series "Breaking Bad," then you probably recognize the name Heisenberg. Werner Heisenberg was a theoretical physicist best known for his uncertainty principle, which states (paraphrasing) there will always be a fundamental limit to the accuracy we can achieve for an estimated or predicted value. That said, a primary goal for scientists is to strive to reduce the uncertainty of results.

Consider wildlife abundance estimates. Accurate and precise population abundance estimates are "the coin of the realm" in wildlife biology. When accuracy and precision are high, uncertainty is low, and managers feel ***confident*** using those abundance estimates to inform essential management actions.

One of the ways to reduce uncertainty is to increase sample size—i.e., the number of observations analyzed. You can probably see the conundrum here for polar bear research: How do you increase sample size when the number of bear-able days is declining?

Our solution has been to invest in diversifying the methods for collecting data. Capturing and handling bears (collecting measurements, taking samples for health assessments, and attaching tracking devices) yields the most diverse and highest quality data. Yet, deteriorating ice conditions are already impacting our work and will make capture less feasible in the years to come. Looking ahead, it will be important to adapt data collection methods to the sea ice conditions encountered during a given field season. In years when capture is infeasible, field crews will need to seamlessly switch to remote sampling methods like biopsy darting, passive genetic sampling (e.g., hair and scat collection), and observational surveys, even though they yield less data. We are also investing in developing statistical methods that can integrate multiple data sources, including Indigenous knowledge.

A FINAL THOUGHT

I often think about that first bear I saw in 2012. I wonder if she's still alive (if so, she'd be 30 years old) and how she coped with the dramatic changes to sea ice habitat that occurred over her lifetime. Polar bear researchers also face challenges—not existential like the bears, but in continuing to provide rigorous science to guide conservation efforts. The U.S. Geological Survey's Polar Bear Research Program is working to meet those challenges head-on. But time is running short to reduce greenhouse gas emissions, conserve Arctic sea ice, and ensure the long-term persistence of polar bears.

Dr. Todd Atwood is a research biologist and project leader with the U.S. Geological Survey's Polar Bear Research Program. He has studied polar bears since 2012.

Polar Bear Cam

Every fall, Polar Bears International, Frontiers North Adventures, explore.org, Parks Canada, and the Churchill Northern Studies Center team up to stream the annual gathering of polar bears from the shores of Hudson Bay to people around the world. Watch the live cam at **polarbearsinternational.org/education-center/polar-bear-cams/**.

COEXISTING *with* POLAR BEARS

continued from page 7

picture of the experience people will and should have with polar bears. The industry needs to train their staff and manage wildlife attractants, not just assume a bear guard with a gun is their only option. Working with Indigenous communities and valuing their perspective through co-management will be key to the future of coexistence.

I strongly encourage the media to rethink their terminology when reporting on bear conflicts. Words like rogue, stalking, and rampant are terms that put the blame on the animal for the incidents and fail to address the root cause of the conflict. These words make people more scared, and they feel like there is no solution but to get rid of the bears. The media has the power to create hope, educate, and increase awareness and safety for residents. Journalists can also inspire people to change their behavior, making communities safer for bears and people. They can put pressure on governments to fund infrastructure for bear-resistant garbage bins and landfills, get more boots on the ground to monitor bear activity, and build support for community-based bear-safe initiatives.

An empowered and informed community willing to make practical compromises can change the narrative and find a bit of grace for an animal that extends so much of it to us.

Kim Titchener lives and works in bear country. The founder of Bear Safety & More, she travels across North America's best bear habitat to educate communities and industries on how to live with bears and other wildlife.

DO POLAR BEARS INVENT TOOLS?

continued from page 9

different areas makes it difficult to know how many first-hand observations there might have been and how many accounts had been handed down from others. However, in a couple of cases, including the one reported by the renowned Arctic ethnologist, Knud Rasmussen, who was also fluent in Inuktitut, it was reported that the description came from a hunter who claimed to have witnessed it himself. Most recently, a fascinating first-hand account of a polar bear possibly using a piece of ice to help kill a walrus in the late 1990s in Northwest Greenland was given by a highly experienced Inuit hunter in a Traditional Ecological Knowledge (TEK) study led by Dr. Erik Born.

INSIGHTS FROM A ZOO BEAR

When trying to understand a polar bear's ability to conceptualize a new behavior needed to access a possible food source such as a walrus, consider a young male bear named GoGo in the Municipal Tennoji Zoological Gardens in Osaka, Japan. He was observed inventing and then learning to use tools. Initially, the zoo staff were simply trying to improvise some enrichment to keep him from becoming bored and possibly developing repetitive stereotyped behavior.

First, the staff hung a piece of meat about three meters above GoGo's pool—which was too high for him to grasp— simply to provide stimulation and distract his attention. Initially he tried to get to the meat by jumping but was unsuccessful. However, within a month, he had invented two "tools" from toys placed in his exhibit for his entertainment. First, he began to throw a short hard piece of plastic pipe at the meat until he knocked it down. Then he picked up the remains of a tree branch to slap the meat off the hook. At first, when using either of these methods, it took him a couple of hours to get the meat, according

This illustration, titled "Bear killing walrus," in an 1865 account by Charles Francis Hall, depicts the use of a rock as a tool to try to kill a walrus, as described to him by a local Inuk hunter.

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(Right) Five-year-old GoGo, a male polar bear in Tennoji Zoological Gardens, Osaka, Japan using tools to access a food source suspended above his reach. Panels show him (A) throwing a piece of plastic pipe, (B) holding a two-meter piece of tree branch, (C) using a small log, and (D) throwing a small, dense, buoy-shaped tool using both forepaws at the same time (photos © Tennoji Zoological Gardens, Osaka, Japan). Reprinted from Stirling et al. (2021) with permission from the Arctic Institute of North America.

to zoo staff, but soon he was able to retrieve the meat in only five minutes! Later he began to use a much larger piece of wood, but as time went on, his preferred tool became a dense object, similar to the initial pipe, which he learned to throw accurately, using both front paws to direct it, much like shooting a basketball.

Because experienced Inuit hunters are known to be reliable observers of wildlife, their accounts of polar bears using tools to hunt walrus are plausible. This conclusion is supported by the direct observations of GoGo teaching himself to launch a projectile accurately in a totally novel situation.

Dr. Ian Stirling is an adjunct professor with the University of Alberta and a research scientist emeritus with Environment and Climate Change Canada. He is also a long-time scientific advisor to Polar Bears International.

Dr. Steven Amstrup cautiously approaches a sedated polar bear on the sea ice off the Alaskan coast, part of a long-term monitoring study. Photo © Daniel J. Cox/NaturalExposures.com

DR. STEVEN AMSTRUP

continued from page 11

The research was exciting, the bears were recovering from their earlier decline, and we were breaking barriers in learning about them almost every season. But even then, things were turning. The symptoms were just not yet obvious to us.

Q: When did you first start noticing changes in the sea ice and with Alaska's polar bears?

During most of those early years in Alaska, the summer sea ice didn't retreat far from the state's northern coast. Back then, I could stand on the shore near Barrow or Prudhoe Bay and see the pack ice even in late summer. If lucky, I might be able to see polar bears hunting seals with the aid of a spotting scope.

At the time, we were able to conduct field research on the sea ice in both the spring and fall. But by the late 1990s, the fall sea ice had become unpredictable. By the time freeze-up had progressed enough to land a helicopter and work safely on the ice, there wasn't enough daylight to conduct our research. The year 2001 goes down in history as the last year we conducted autumn field work on the ice.

By then, our research had shown that polar bears need sea ice to reach their seal prey—so the retreat of the ice and the increasing numbers of polar bears onshore in summer were both troubling signs that big and negative changes were afoot.

Q: In 2007, you spearheaded a team that led to the polar bears' listing as a threatened species under the Endangered Species Act. Can you tell us about that?

By then, I had earned a PhD in biology from the University of Fairbanks and my job function had been transferred to the U.S. Geological Survey in

Alaska. Our findings and those of researchers in other countries had revealed the emergent threat that climate warming posed for polar bears.

Environmental groups had petitioned the U.S. government to list polar bears under the Endangered Species Act. My team and I were tasked with advising the Secretary of Interior on whether a listing was warranted. Our deadline was six months, a timeframe so tight we had to recruit researchers from other agencies and jurisdictions, expanding our USGS team from five to 17. The work was so intense that I moved a sleeping pad and hot plate to my office.

In the end, we assembled nine reports that told a dire story. We projected that we could lose two-thirds of the world's polar bears by the middle of this century, and possibly all of them by century's end, without significant greenhouse gas reductions. Convinced by our findings, the U.S. listed the polar bear as a threatened species under the ESA on May 14, 2008. With this act, polar bears became the first species ever to be listed because of future threats from human-caused global warming.

Q: Two years later, you were the lead author of a paper in Nature showing it wasn't too late to save polar bears, that their future depended on reducing greenhouse gas emissions. That was also the year you joined Polar Bears International's staff. Was there a link between the two?

By then, my research and that of others in other countries had outlined the problem facing polar bears and answered the question, "What do we need to do to save them?" While there was still more research to be done to fully understand the bears, it was already clear that saving polar bears from extinction would require global action to restructure how we generate and use energy. I realized that the most important role I could play was to share what I knew about the bears and the threat of global warming—with as broad an audience as possible—and Polar Bears International, a science-based organization with an approach that I respected, gave me a platform for doing that.

Q: Since then, you have been tireless in your outreach while also continuing to publish research. Has anything about this work surprised you?

I originally planned to stay with Polar Bears International for about five years—thinking that, by then, societies would have moved toward more sustainable CO_2 emissions pathways and the future for polar bears would be more secure. I had many reasons to be optimistic, but boy was I wrong. I didn't fully appreciate the power of the denial movement. I also didn't imagine that our policy leaders, many of whom are smart people, would choose to literally ruin the world in exchange for the further enrichment of a very few. So, the initial five years stretched into more than a decade—and we still have far to go.

Q: Slow progress by the world's governments must be incredibly frustrating for you. How do you keep going?

That's a tough one. My core values are rational thought and evidence-based decision making. It's hard for me to understand why governments have been so slow to prioritize action on climate warming when the science and the logical actions indicated by that science are so clear. Yet I'm heartened by the passage of the U.S. climate bill. It's the biggest step in the right direction the U.S. has ever taken. My hope is that it will be a game-changer, in the U.S. and globally.

Q: You have a big parka to fill. Who will take on your role at Polar Bears International after you've stepped down to an emeritus position?

After giving this a lot of thought, I reached out to two young scientists whom I greatly admire. Both were eager to get involved. Dr. John Whiteman of Old Dominion University is our new chief research scientist and Dr. Flavio Lehner of Cornell University is our new chief climate scientist. Between them, they have extensive knowledge about polar bears, sea ice, and climate warming. Both are rising stars in their research fields and are devoted to seeing their findings applied to societal challenges. The combination of research and conservation leadership they embody is what Polar Bears International needs to move us forward. Knowing they're on board makes it easier for me to move to an emeritus position.

Q: What are your plans going forward? What is the future you would like to see?

Spending time with my wife, Virginia, is my top priority. We want to be able to enjoy life and do things together while we still can. As for the future, I hold onto the hope that momentum from the public and recent U.S. actions will motivate global leaders to prioritize climate warming—and that I won't simply go down in history as a polar bear historian.

Barbara Nielsen is the senior director of communications for Polar Bears International.

SATELLITE TRACKING

continued from page 13

bear that traveled up to 5,000 kilometers in one year! For polar bear populations where satellite data have been consistently collected, the information has been critical to conservation and management. In contrast, a lack of data in some populations where collaring has waned—and in areas like most of the Russian Arctic, the Arctic Basin, and the Last Ice Area in northern Canada and Greenland where little research has been done—has led to uncertainty about the size and health of the populations there, which can have a range of negative consequences.

As sea-ice loss due to climate warming continues, satellite data have become even more critical. We now have a greater need to monitor where polar bears roam, how they use their habitat, how abundant they are, and whether populations can remain connected with each other. Climate warming is shifting the geographic ranges of polar bears—inside and outside of historical population boundaries—resulting in altered population dynamics and the appearance of bears in new areas. This includes places where polar bears are encountering people for the first time, potentially putting both at risk.

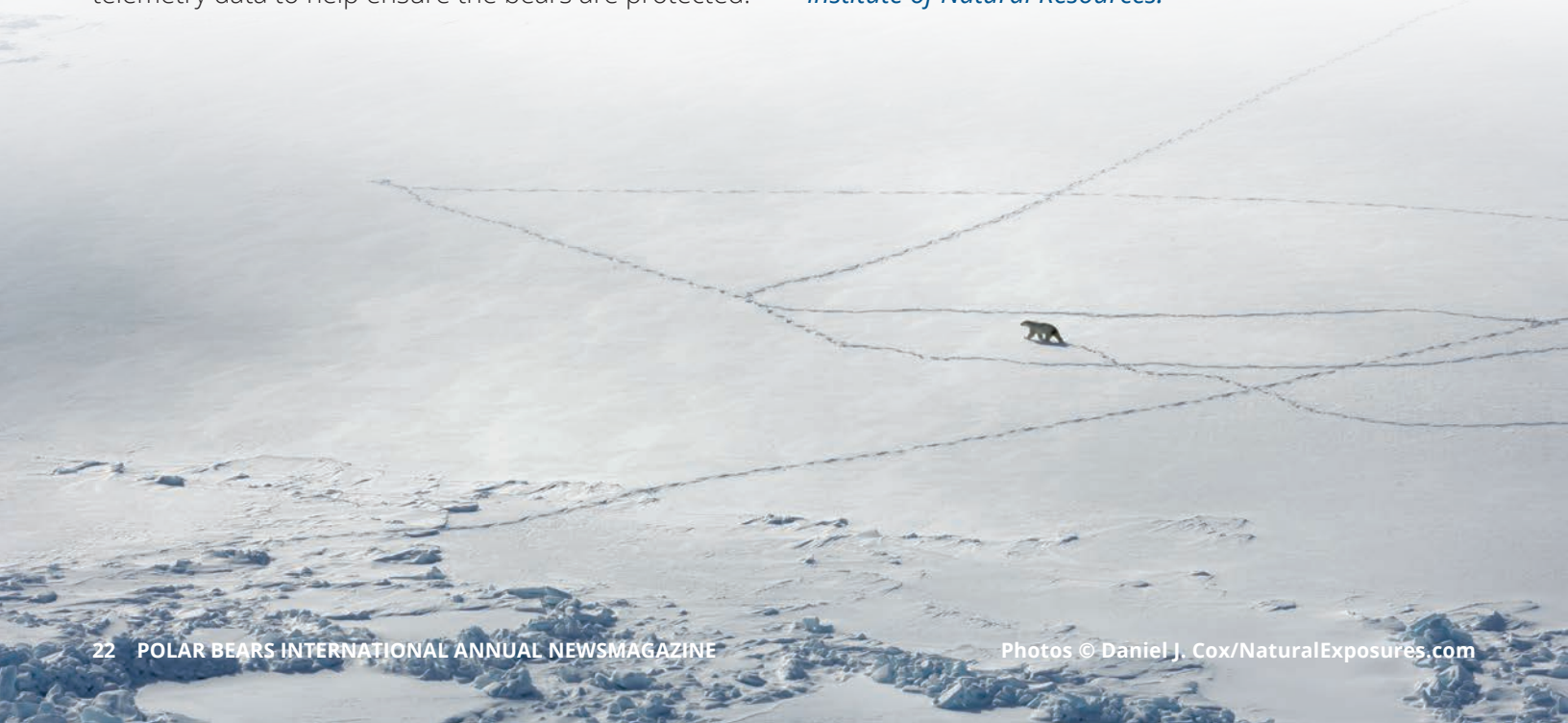
With a sea-ice-free Arctic expected within decades, it will be critical to understand how bears redistribute.

Some populations may become genetically or demographically isolated, with ramifications for population viability and sustainable use by Indigenous communities. Further, increasing development in the Arctic such as new shipping routes and resource extraction will require access to contemporary satellite telemetry data to help ensure the bears are protected.

"Because we can't physically follow polar bears throughout the year, satellite tracking has made an enormous difference in studying polar bears."

As we move into a new era of Arctic sea ice, data from satellite-tracked polar bears will allow managers to make informed management and regulatory decisions—and will be vital to the conservation of polar bears in the 21st century.

Dr. Kristin Laidre is a research scientist at the University of Washington and a biologist with the Greenland Institute of Natural Resources.



Polar Bears International

CALENDAR OF EVENTS

INTERNATIONAL POLAR BEAR DAY
February 27th

ARCTIC SEA ICE DAY
July 15th

BELUGA CAM
Mid July-mid September

POLAR BEAR CAM
Late October-late November

POLAR BEAR WEEK
First week of November

NORTHERN LIGHTS CAM
November-March

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